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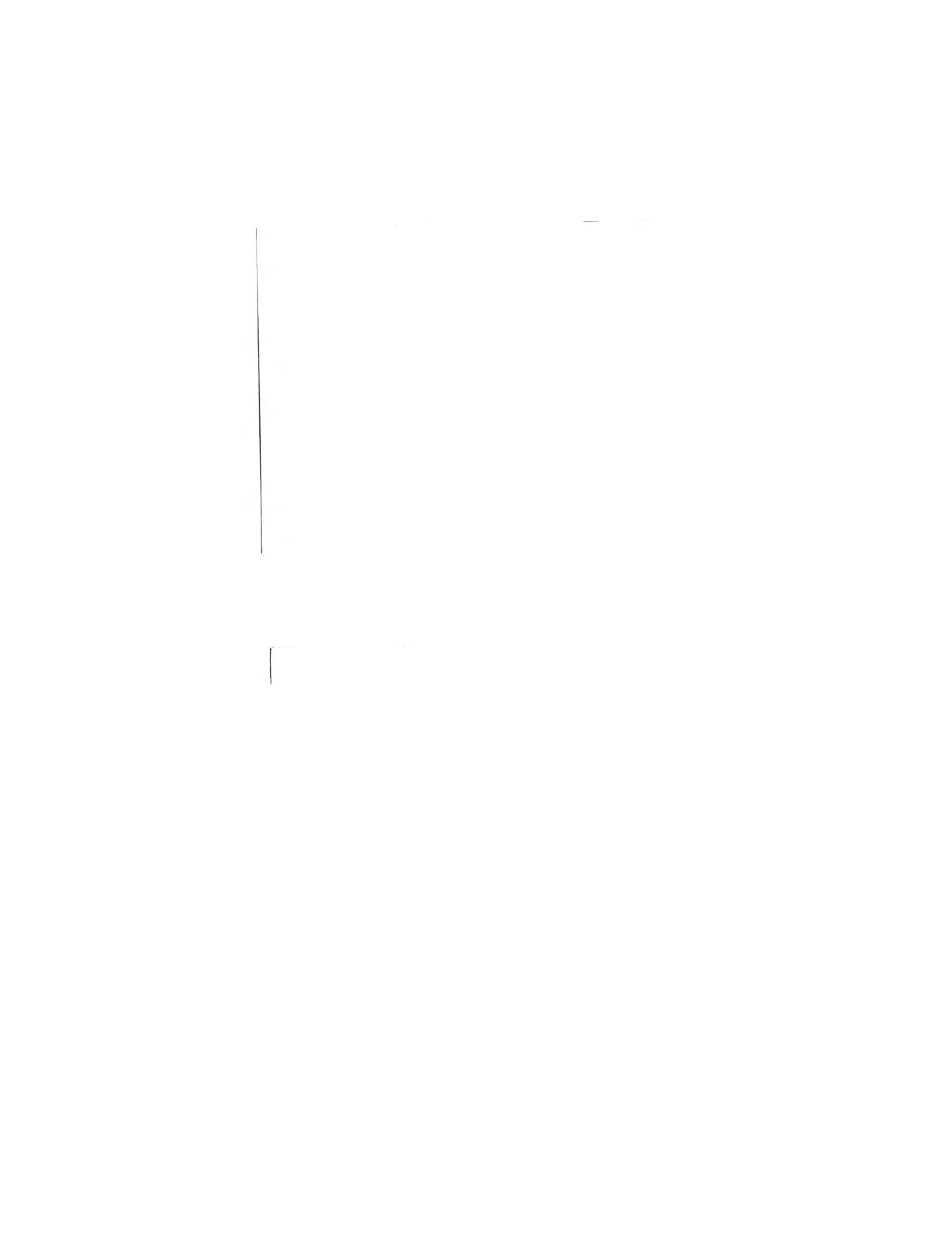
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Affective Response to the Use of
Information Technology in
Monitoring Performance

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Management in the 1990s



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**Management in the 1990s
Sloan School of Management
Massachusetts Institute of Technology**

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DETERMINANTS OF EMPLOYEES' AFFECTIVE RESPONSE TO THE
USE OF INFORMATION TECHNOLOGY IN
MONITORING PERFORMANCE

Abstract

The results of this study show that employees' affective response to computer-aided monitoring is largely predicted by supervisory approaches to the use of the performance information. Specifically, many of the factors previously found to influence responses to performance appraisal sessions in general, most notably the nature of feedback, are also predictive in this context.

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Introduction

Computer-aided monitoring of employees in large-volume office operations has become the subject of intense debate. The critics, on the one hand, view it as rife with abuse--denigrating to employees and an invasion of privacy (Nussbaum and duRivage, 1986; Shaiken, 1987; 9 to 5, 1986). Proponents, on the other, view its use as essential to conducting business and largely beneficial to employees in terms of its capability to instruct them in their work (Westin, et. al. 1985; Manoocheheri, 1985). Other than anecdotal evidence and a handful of case studies, there are few data to support either claim.

Currently, as many as 28 million Americans use computer terminals in their jobs. Although no precise data are available, it is estimated that one third of the terminals are computer monitored (Hickey, 1987). Moreover, the number of terminals in use is expected to increase substantially by 1990. Given this prediction, the impact of computer monitoring on the workplace deserves considerable attention.

While the debate over monitoring has served to sensitize people to the potential of information technology to alter office work radically, our current inability to adequately inform this debate places in sharp relief our lack of theory and empirical knowledge pertaining to the impact of information technology in office settings.

Alternative Approaches To Conceptualizing The Effects Of Monitoring

Although monitoring has been the subject of intense debate, little effort has been made to construct a theoretical framework for assessing its actual role at the workplace. One conceptual approach favored by some organizational theorists has focused on the concept of control (Blau and Scott, 1962; Edwards, 1979; Ouchi, 1977; Eisenhardt, 1986). However, the conceptual literature on control has been developed based on previous generations of control mechanisms embedded in physical technology. Information technology in office settings adds new dimensions to past conceptualizations of technological control. This technology is not only capable of initiating and pacing work (Blau and Scott, 1962; Edwards, 1979), but also of monitoring and evaluating work.

Others have attempted to draw a distinction between an organization's output and/or behavioral control strategy (Ouchi and McGuire 1975; Ouchi, 1977, Eisenhardt, 1986). With information technology it is possible to intensify and expand behavioral control. Not only is it possible to assess employees' general work behaviors, but also behaviors that in the past were assessed informally, if at all -- employee interactions with clients.

None of the previous efforts to conceptualize control strategies have developed testable propositions relating their actual use to organizational or individual outcomes. Instead,

previous models have treated control strategies as dependent variables to be explained by the nature of technology or the organization's task environment. In contrast, examining the effects of a control strategy requires a model that is capable of predicting how individuals respond to various control strategies.

Thus, a new approach is needed that goes beyond existing literature on control to assess the actual impacts of computer-aided monitoring. One promising approach is to cast the study of computer-aided monitoring within the framework of performance appraisal since this literature a) has long debated the issue of assessing employees' performance on the basis of outputs and/or behaviors, and b) is focused on the individual-level of analysis.

Moreover, research on performance appraisal offers a sharper analytical model because it suggests that a monitoring and evaluation process has both potential control and feedback characteristics, and that the response of employees will differ depending on whether control or feedback dominates. That is, the more the process takes on feedback characteristics, the more positive the employee's response is expected to be. This paper will develop and test the power of performance appraisal/feedback research to provide a theoretical framework by which one can assess the consequences of computer-aided monitoring.

Method

To do this, data were collected in twenty computerized tax-collection offices of the Internal Revenue Service (IRS). These

tax-collection offices are collectively referred to by the IRS as their Automated Collection System (ACS). The data were collected in two stages. First, a total of 91 interviews were conducted in five of these offices with employees, supervisors, and managers. Second, a survey instrument based largely on the interviews was developed and administered to 960 employees in ACS. Seven hundred and forty completed questionnaires were returned. Both methods inform the analysis in this paper.

Hypotheses

Prescriptions for the effective conduct of Performance Appraisal sessions rely heavily on the findings of the performance feedback literature (Walther and Taylor, 1983, Reinhardt, 1985). This literature has focused on the factors associated with recipients' perception of feedback, acceptance of feedback, and desire to respond to feedback (Ilgen et. al., 1979). Summarizing the literature, Ilgen, et. al., suggest three broad categories that influence the effectiveness of performance feedback. These are: 1) message characteristics, 2) source characteristics, and 3) recipient characteristics.

Message Characteristics: Factors that influence the perceived feedback message are: 1) the timing, 2) the sign, and 3) the frequency of feedback. In general, positive reactions to performance feedback are correlated with feedback that is presented with little time delay, is positive in nature, and that

is frequent. There is a strong suspicion that the more frequent the feedback, the better, although this is expected to be moderated by the recipient's task experience. People with relevant job knowledge are likely to perceive frequent feedback as unnecessary and therefore will be less receptive to it. However, field studies suggest that this is not likely to be an issue in most settings, as performance feedback is seldom given (Wexley, 1979; Taylor et. al., 1984).

In the interviews, some employees in ACS noted that delayed feedback was difficult to associate with particular behaviors--that even though they were frequently monitored, they did not receive as much feedback as they wanted. A commonly voiced criticism was: "They [supervisors] only tell you what you did wrong, not what was good." Thus:

- H1: Immediacy of feedback has a positive and significant effect on satisfaction with computer-aided monitoring.
- H2: Frequency of feedback has a positive and significant effect on satisfaction with computer-aided monitoring.
- H3: Sign of the feedback has a positive and significant effect on satisfaction with computer-aided monitoring.

Source Characteristics: When the primary source of performance feedback is the immediate supervisor, the salient characteristics are the extent to which the employee perceives him/her as possessing the technical expertise to judge performance behaviors

accurately, and the extent to which the employee trusts the supervisors. In field settings the trust construct has been measured by asking employees direct questions pertaining to how much they trust their supervisor (Ilgen, et. al. 1981), or in theoretical writings by some measure of the employees' perception of the supervisor's leadership style -- for example, consideration behavior (Kerr and Slocum, 1982).

In the interviews, supervisory expertise (knowledge of tax laws and procedures used in ACS) was mentioned as critical to carrying out effective monitoring reviews. Employees also noted that the monitoring was neither good nor bad in itself, but depended on how supervisors approached it. This is consistent with the conclusions of case studies on this issue (Attewell, 1987; Westin, et. al., 1985). A familiar comment by some employees in ACS was that some supervisors abused it, "use it only to control you, rather than develop you."

Thus:

H4: Supervisory expertise has a positive and significant effect on satisfaction with computer-aided monitoring.

H5: Supervisory consideration behavior has a positive and significant effect on satisfaction with computer-aided monitoring.

Recipient Characteristics: Individuals' Locus of Control (Rotter, 1966), and age have been shown to affect the recipients' reception of feedback. Ilgen suggests that the finding with respect to age is most probably due to the positive correlation

between age and experience, or job tenure. Thus, he recommends that future studies should include some measure of experience or tenure.

Based on Ilgen, et. al. (1979), tenure of employees might be expected to be negatively correlated with the frequency of feedback. However, prior literature gives no indication that tenure will be negatively correlated with satisfaction with performance feedback. But, in the interviews in ACS, tenure was suggested as associated with lower general satisfaction levels. In the opinion of many supervisors, the most difficult employees, those that complained the most, were those that had been around a long time.

On the other hand, some of the more experienced employees countered that supervisors just didn't know how to manage. With regard to the effect of tenure, several factors are likely operating in combination. For example, the employee's job expertise, versus that of the supervisor, and the toll of a routine, often stressful job overtime (collecting taxes). On balance, tenure in ACS is expected to be negatively related to satisfaction with computer-aided monitoring. Thus:

H6: Employee tenure has a negative and significant effect on satisfaction with computer-aided monitoring.

In addition to the above factors, specific support for the feedback is suggested as important. That is, specific critical incidents should be included in the feedback session so that the

employee understands the basis for the assessment (Berger, 1983; Leskovec, 1967).

Information technology allows for the measurement of specific employee behaviors or critical incidents. Thus, the basis for evaluation should be seen as less subjective. One employee stated that she came to work in ACS because:

The performance evaluation is more objective. It doesn't depend on anyone's perception of what you're doing. You can argue on it, but it's right there for you to see and for them to see.

However, other employees disagreed that it was an objective process. Supervisory favoritism was often mentioned as was the "central tendency" of the performance ratings -- "everyone gets a three" -- on a five point scale. While desired employee behaviors are made explicit, the actual criteria used by the supervisor were often left unspecified. Thus:

H7: Clarity of rating criteria has a positive and significant effect on satisfaction with computer-aided monitoring.

On the basis of the interviews, two additional factors are expected to be significant predictors: 1) a variable measuring the absolute difference between employees' actual percentage of remote monitoring and their percentage of desired remote monitoring¹, and 2) employees' base-line attitudes toward telephone monitoring.

¹ In side-by-side monitoring, supervisors sit next to the employees while monitoring the call. In remote monitoring, supervisors monitor from their office, usually without employees' knowledge that they are being monitored.

The first variable is included because the method of monitoring, side-by-side, or remote, is decided by management in ACS. Thus, the larger the discrepancy between managerial practice and employee desires, the less positive will be employee perceptions of the process. The second variable, base-line attitudes, is a measure of employees' basic orientation toward monitoring. It is made up of three items tapping the extent to which the employee agrees or disagrees that monitoring: 1) is a good tool if used properly, 2) is an invasion of an employee's privacy, and 3) that supervisors should not be allowed to do any monitoring.

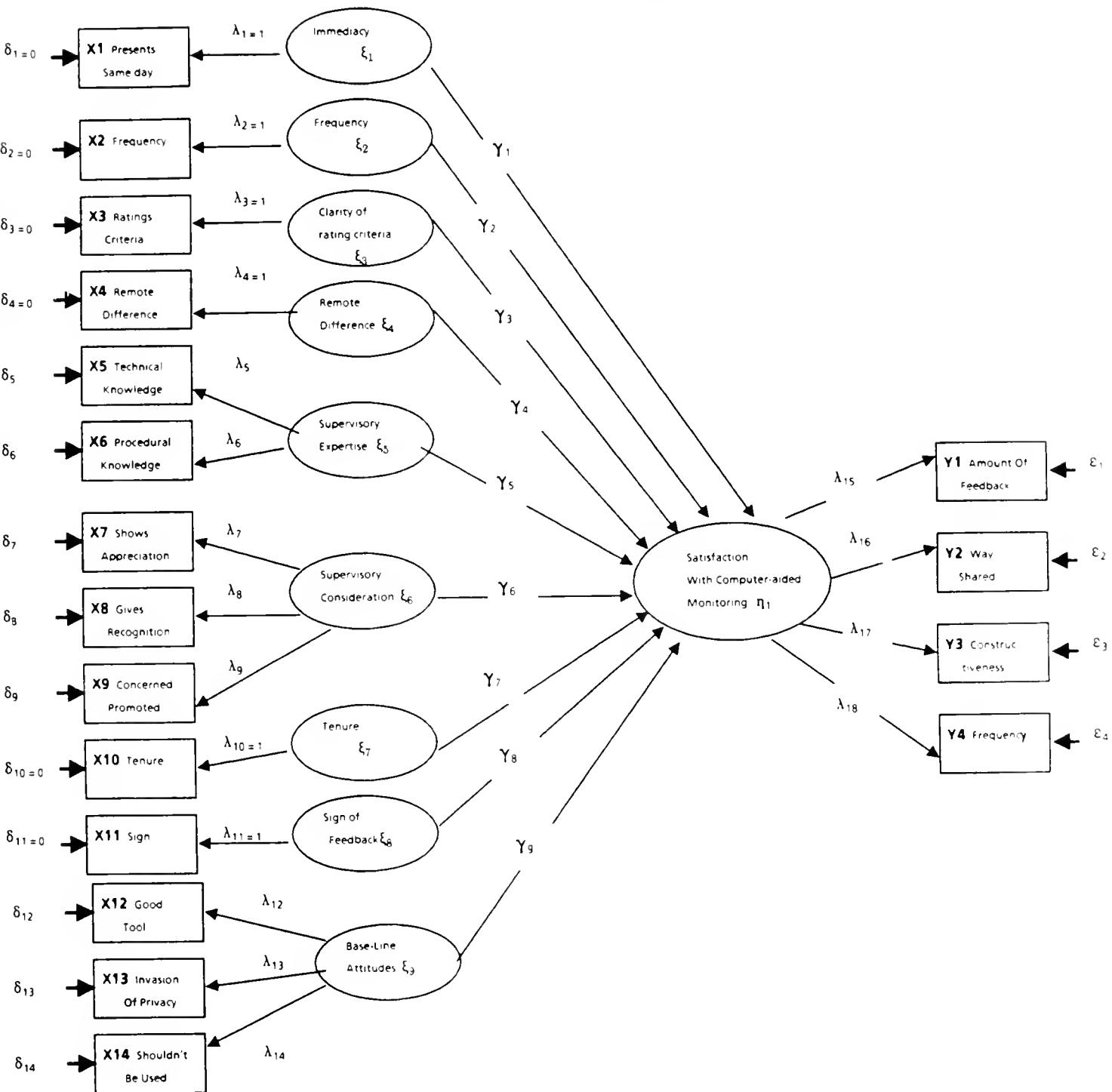
H8: The absolute difference between actual and desired remote monitoring has a negative and significant effect on satisfaction with computer-aided monitoring.

H9: Favorable base-line attitudes toward monitoring have a positive and significant effect on satisfaction with computer-aided monitoring.

Measurement of Variables and Model

A list of all the indicators, and questions from the questionnaire from which they were derived, are shown in the Appendix. There are 18 indicators comprising the nine exogenous constructs and one endogenous construct in the model. The model (Figure 1) represents a structural equation system, with observed variables and unobserved constructs. Four of the constructs -- supervisory expertise, supervisory consideration

FIGURE 1
**STRUCTURAL EQUATION MODEL OF SATISFACTION
WITH TELEPHONE MONITORING**



behavior, employees' base-line attitudes toward telephone monitoring, and satisfaction with telephone monitoring -- are latent constructs derived from manifest (observed) variables. The remaining constructs are each measured by a single variable.

The model was tested using LISREL VI, a full-information, maximum-likelihood estimation procedure (Joreskog and Sorbom, 1985). A principal strength of the LISREL program is its capability to simultaneously estimate the measurement model (loadings of observed variables on latent constructs) and the structural equation model (The causal relationship among latent constructs, and the unexplained variance).

Reliability Assessment Of The Multiple Variable Constructs

The associated t-values for the measurement parameters are all large and significant (Table 1). This indicates that the variables explain a significant amount of the variation in the latent constructs they indicate. These parameter estimates can be used to calculate the composite measure reliability (p_c) of the constructs (Werts, Linn, and Joreskog, 1974). p_c for supervisory expertise was 0.90, supervisory consideration behavior 0.94, base-line attitudes 0.76, and satisfaction with computer-aided monitoring 0.91. These indicate that the constructs have acceptable trait variance. In addition, these results are the same as those derived from the more commonly used index, Cronbach alpha (Table, 2).

TABLE 1

Maximum Likelihood Estimates for the Model In Figure 1

Causal paths	Standardized ML Estimate	t-Value	Squared Multiple Correlations ¹
Y ₁	.292	7.47*	
Y ₂	.066	1.79	
Y ₃	.089	2.42*	
Y ₄	-.053	-1.50	
Y ₅	.117	2.74*	
Y ₆	.265	5.20*	
Y ₇	-.009	-0.23	
Y ₈	.165	4.19*	
Y ₁₀	.048	1.20	
Parameters for Measurement Model			
λ ₅	.809	20.6	.65
λ ₆	1.0	27.8	1.0
λ ₇	.935	28.8	.88
λ ₈	.942	29.2	.89
λ ₉	.870	25.4	.76
λ ₁₂	.597	13.3	.35
λ ₁₃	.762	16.9	.60
λ ₁₄	.801	17.7	.65
λ ₁₅	.792	20.7	.63
λ ₁₆	.915	25.4	.83
λ ₁₇	.906	25.0	.82
λ ₁₈	.772	20.0	.61
var(δ ₅)	.345	10.1	
var(δ ₆)	.000	.000	
var(δ ₇)	.125	9.35	
var(δ ₈)	.113	8.64	
var(δ ₉)	.244	13.4	
var(δ ₁₂)	.643	13.7	
Var(δ ₁₃)	.420	8.8	
Var(δ ₁₄)	.358	7.2	
Var(ε ₁)	.373	14.2	
Var(ε ₂)	.163	9.7	
Var(ε ₃)	.18	10.3	
Var(ε ₄)	.404	14.4	

 χ^2 (df: 102) = 257; p < .001

GFI = .947

RMR = .027

R² = .466

¹The squared multiple correlation represents the amount of variance explained in the variable due to its relationship with the construct it indicates.

*Significant at p ≤ .05

TABLE 2

Product-moment Correlations¹, Means, Standard Deviation and Reliabilities for Satisfaction With Telephone Monitoring Predictors

Construct	Mean	S.D	Number of Variables	ρ_c	1	2	3	4	5	6	7	8	9	10	
1.Immediacy Of Feedback	4.0	1.4	1	na ²	na	1.00									
2.Frequency Of Feedback	4.6	2.2	1	na	na	.26	1.00								
3 Clear Rating Criteria	3.2	2.0	1	na	na	.13	.02	1.00							
4.Remote Mon. Difference	24.2	33.4	1	na	na	-.11	.04	-.15	1.00						
5. Supervisor's Expertise	9.4	2.7	2	.90	.90	.26	.14	.25	-.15	1.00					
6Supervisor's Consideration	12.3	5.3	3	.94	.94	.36	.18	.28	-.19	.58	1.00				
7 Employee's Tenure	4.6	1.7	1	na	na	-.13	-.25	-.11	-.06	-.18	-.14	1.00			
8. Sign of feedback	.62	.48	1	na	na	.19	.00	.23	-.18	.28	.43	.08	1.00		
9 Base-line Attitudes	11.4	3.2	3	.76	.76	.02	-.08	.12	-.07	.12	.15	.02	.13	1.00	
10 Satisfaction With Telephone Monitoring	10.9	4.0	4	.91	.91	.48	.21	.28	-.19	.44	.56	-.12	.40	.14	1.00

¹ Correlations of .07 and above are significant at $p \leq .05$, with $n = 536$

² na = not applicable

Support For Hypotheses

The coefficient of determination for the structural equation R^2 was .466 (Table, 1). Thus, close to 47 percent of the variance in the dependent variable was explained by this set of predictors. The hypothesis about the effect of the immediacy of feedback was strongly supported $Y_1=.292$ ($t=7.47$). This was the largest of all the coefficients. There was little support for the influence of frequency of feedback, $Y_2=.066$ ($t=1.79$). It was in the expected direction, but not statistically significant. The influence of clear rating criteria was in the expected direction and was statistically significant, $Y_3=.089$ ($t=2.42$). However, the absolute difference between actual and desired remote monitoring, while in the expected direction, was not significant, $Y_4=-.053$ ($t=-1.50$). Both supervisory characteristics were supported, $Y_5=.117$ ($t=2.74$), and $Y_6=.265$ ($t=5.20$). Supervisory consideration had over two times as much influence as supervisor expertise. Employee tenure had no influence on satisfaction with telephone monitoring $Y_7=-.009$ ($t=-0.23$). The sign of the feedback coefficient was positive and significant, $Y_8=.165$ ($t=4.19$). The influence of favorable baseline attitudes was positive, but not significant, $Y_9=.048$ ($t=1.20$).

Thus, there was statistical support for five of the nine hypotheses. In order of their influence on the dependent variable these were: immediacy of the feedback, supervisory consideration behavior, sign of the feedback, supervisory

expertise, and clear rating criteria.

Discussion

The results of the analysis show that employees' satisfaction with computer-aided monitoring is on the whole consistent with prior theory on performance feedback and the interviews in ACS. The source characteristics, supervisory expertise and consideration behavior, were significant predictors. Moreover these constructs are significantly correlated with many of the other independent constructs (Table 2). Supervisory consideration behavior was significantly correlated with six of the eight remaining constructs², while supervisory expertise was significantly correlated with five of

² In Table 3, a correlation of .07 is statistically significant at $p \leq .05$. Given that the standard error of r is variant to sample size (and thus in large samples, small effect sizes will be statistically significant), it is important to take into account the power of the test. The power of the test is the probability of rejecting the null hypothesis and accepting that the phenomenon exists. With $N=532$, and $r=.07$, the power of the test is .65 (Cohen, 1969). That is, in 35 times out of 100 we would accept the null hypothesis. In the present research a conservative power value of .99 was adopted. With a power level of .99 and $N=532$, the threshold for a significant r is .17 (one directional test). With the above values we will reject the null hypothesis 99 times out of 100. Thus, we can have some confidence that the effect is there when discussing correlations of .17 or above. Therefore, correlations of under .17 will not be considered significant by the standard set above.

these. This confirms the interview data which suggest that employees' perceptions of telephone monitoring are strongly influenced by the approach to the monitoring taken by their supervisor.

Most important among these indicators of approach is the immediacy of the feedback. This construct is central to explaining employees' satisfaction with telephone monitoring. If all the other independent constructs were left out of the equation, immediacy of feedback would account for 21 percent of the variation in the dependent construct. Also important to an effective approach to monitoring are the sign of the feedback and clear rating criteria.

While the remote-difference monitoring construct did not significantly influence satisfaction with computer-aided monitoring, its negative correlation with other independent constructs suggests that the difference between actual and desired remote monitoring will be small where the overall approach taken by the supervisor is perceived as reasonable. However, these correlations are not generally large, suggesting that other factors are related to this variable.

Tenure had no influence on satisfaction with telephone monitoring. However, it was negatively correlated with supervisory expertise, although not significant with immediacy of the feedback, clear rating criteria, and supervisory consideration behavior (Table 2). Though tenure was the variable suggested by theory and supported by the case interviews, a test

for the influence of other demographic variables (age, education, and sex) on satisfaction with computer-aided monitoring was run. None of these were significant, $r=-.039$ for age, $r=.109$ for education, and $r=-.007$ for sex. Thus, satisfaction with monitoring appears to be contingent on approaches to its use, and not on individual characteristics, nor on office-level characteristics³.

Base-line attitudes were not predictive of the dependent variable. Moreover, this construct was not significantly correlated with any of the other independent constructs. While it is unlikely that base-line attitudes are unaffected by being in situations where monitoring is taking place, it appears to be quite independent of both satisfaction with monitoring, and factors indicating approaches to its use. Indeed, its correlation with tenure, $r_{,,}=.02$, suggests that these attitudes toward telephone monitoring are not a function of time on the job.

Managerial Implications

There are a few managerial implications that follow from the results of the study. First, managerial efforts aimed at improving the effectiveness of computer-aided monitoring need to

³ The importance of office-level context was tested in this research by using a sheffe pairwise test. There were essentially no significant differences among the twenty offices for all of the constructs in the model. Moreover, there were no differences based on a fixed effects model.

focus on characteristics of the appraisal or feedback process. Tenure, age, sex, and education of employees had no significant influence on their satisfaction with computer-aided monitoring; nor were there any significant differences by office.

This does not imply that the organizational level is unimportant. Organizational rules pertaining to the uses of performance information, informing employees that they are subject to monitoring, etc., are desirable and necessary. However, notwithstanding general rules and policies, employees' affective responses to computer-aided monitoring appear to be largely determined by characteristics of the monitoring and evaluation process.

Receiving performance feedback in a timely manner is very important to employees. It was the strongest predictor of satisfaction with computer-aided monitoring. Since performance reviews and feedback are central to the work situation in automated offices, the timing of the feedback appears to carry more weight in employee assessments of the process than is likely to be the case in work situations where performance reviews take place less often.

The importance of feedback process characteristics suggests a point repeatedly made in the performance appraisal literature. That is, there is a need for training reviewers in the handling of performance reviews. This is particularly salient in automated offices where computer-aided monitoring is integral to the work situation. The results of this study suggest that

employees respond positively to the use of computer-aided monitoring to the extent that a positive developmental approach is fostered.

The finding with regard to base-line attitudes suggests that employees have predispositions toward monitoring that are not influenced by its actual use, nor by their length of time on the job. This indicates that there may be a poor fit between these individuals and the job that might better be assessed early in the selection process.

Conclusions

The results presented in this paper show that computer-aided monitoring can be conceptualized and explained by hypotheses drawn from performance appraisal and feedback research. Approaches to the use of information technology have effects similar to supervisory practices of the past. Thus, this strongly suggests that the essence of effective performance reviews is the same whether they are carried out in automated or non-automated work settings.

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APPENDIX

List of questions used for all variables in the model

Timeliness

X1 With regard to the feedback I receive from telephone monitoring, my supervisor presents it to me personally, the same day (1 = Almost Never; 7 = Almost Always)

Frequency

X2 How often are you provided with information pertaining to your performance on telephone monitoring (1 = Never, 7 = Daily)

Rating Criteria

X3 "In this call site there are clear criteria set out regarding what is necessary to get an outstanding rating on telephone monitoring reviews" (1 = Strongly Disagree, 7 = Strongly Agree)

Remote Difference

X4 There are different approaches to telephone monitoring. In some call sites all of it is done on a remote basis (from supervisor's desk), while in other call sites it is done on a side-by-side basis (supervisor sits next to the employee). Other sites use both methods. Please indicate in percentage terms, the relative use of these methods by your supervisor. If only one method is used, please allocate all 100 percent to it.

METHOD	PERCENT
Remote monitoring	_____ %
Side-by-side monitoring	_____ %
TOTAL	100 %

The same question was asked for their percentage of either method that they desired.

Supervisory experience

X5 My supervisor, knows a great deal about the technical side of my job

X6 Has a good understanding of the procedures I use in my work

Supervisor's consideration behavior

X7 Provides appreciation and encouragement

X8 Gives recognition for a job well done

X9 Is concerned that I grow and get ahead professionally

(1 = Not At All Accurate; 7 = Extremely Accurate)

Tenure

X10 Length of time in this call site. (1 = 0 to 3 months, 6 = over 24 months)

Sign

X11 Overall, the feedback I receive is mainly 1 Positive, 2 Negative

Base-line Attitudes

X12 Telephone monitoring is a good tool if it is used properly

X13 Telephone monitoring is an invasion of an employee's privacy

X14 Supervisors should not be allowed to do any telephone monitoring (1 = Strongly Disagree; 7 = Strongly Agree)

Satisfaction with telephone monitoring

How satisfied or dissatisfied are you with the following items pertaining to telephone monitoring

Y1 The amount of feedback you receive

Y2 The way in which feedback is shared

Y3 The constructiveness of the feedback

Y4 The frequency of the feedback (1 = very dissatisfied, 7 = very satisfied)

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